

## SYSTEM AND METHOD FOR MOVING STORAGE CLOSETS

5

### REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/449,669 (031132-2) to Cash, filed February 24, 2003, hereby incorporated by  
10 reference in its entirety.

### TECHNICAL FIELD OF THE INVENTION

The present invention relates to storage closets that are used in residential dwellings. More particularly, the present invention relates to containers that can be  
15 moved from one location to another by means of an automated conveyor system and that are specially designed to be suitable for a wide range of different specialized storage uses.

### BACKGROUND OF THE INVENTION

20

Traditionally, buildings contain a limited number of rooms because of practical design considerations. These considerations include placement of windows and entrances to rooms, and the need to retain wall space to place furniture against. Because they are stationary spaces that are permanently fixed in position, they require dedicated  
25 floor space. For each additional room there is an increase to the overall building size. Subsequently, each additional room adds additional construction cost, and often an increase in property tax expense.

Because room space is limited and insufficient, many people resort to using basements and attics for additional storage capacity. The problem with using basements

and attics for storage is that items must be hauled up or down flights of stairs or perhaps even up and down ladders. This requirement limits the practicality of storing regularly used items and items that may be large, heavy, or awkward to move. And, these areas may be inaccessible altogether by people that have physical limitations.

5           Another problem with using basements or attics for storage is that they can be harsh environments for the items that are stored there. Basements are often damp, causing mold and mildew damage to stored items. Attics are often excessively hot and dry causing items such as fabric, paper and plastics to dry out and deteriorate. These environments are also often dusty and dirty and can be home to spiders and insects that  
10   make their homes inside of stored items.

          Another problem many people are faced with is that they not only lack the room to store objects, they lack the space to use them. Office equipment, furniture, children's toys, computers, exercise equipment, appliances, electronics, tools, and collections of one sort or another are just a few of the many examples of items that must compete for both  
15   storage space and use space within a building. Often the enjoyment or use of these items is compromised because they must be used in an inadequate or cluttered space. The solution to this problem has been to build additional rooms to house these objects and to provide space for their use. These rooms are then designated as special use areas such as: office, playroom, guest bedroom, laundry room, media room, craft room, hobby room,  
20   study room etc. The problem with this solution is that it is very costly to add additional rooms and is beyond the affordability of many. In many cases the cost of the room is greater than the cost of the items for which the room was built. These additional special

use rooms also require additional utility expense to heat and cool, along with additional maintenance and property tax expense.

## **SUMMARY OF THE INVENTION**

The invention is described solely in the claims and this section is not intended to limit or expand the invention as described in the claims. In one form of the present invention, an apparatus for improving storage capacity is described. The apparatus includes a building having at least one room; at least one storage container containing a room concept; a first positioning system that locates the container and positions the container for transport; and a second positioning system that obtains said storage container and replaces said room with said storage container.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a perspective view of one embodiment of the present invention.

5        FIG. 2 is an exploded view of the second positioning system of FIG. 1.

FIG. 3 is an exploded view of the carrying frame of FIG. 1.

FIG. 4 is an exploded side view of containers of FIG. 1.

FIG. 5 describes one possible room concept according to one embodiment of the present invention.

10       FIG. 6 describes the room concept of FIG. 5 expanded into its useable position.

FIG. 7 describes another room concept according to one embodiment of the present invention.

FIG. 8 describes the room concept of FIG. 7 expanded into its usable position.

15       FIG. 9 describes yet another room concept according to one embodiment of the present invention.

FIG. 10 describes the room concept of FIG. 9 expanded into its usable position.

FIG. 11 describes an alternate embodiment of the invention.

## **DETAILED DESCRIPTION OF SELECTED EMBODIMENTS**

For the purposes of promoting understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no  
5 limitation of the scope of the invention is hereby intended and alterations and modifications in the illustrated device, and further applications of the principles of the present invention as illustrated herein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now to the drawings, room exchange system 20 is illustrated in FIG. 1.

10 In one embodiment, the room exchange system 20 includes containers 21, a first positioning system 28 and a second positioning system 38. The first positioning system 28 and the second positioning system 38 work together to move the containers 21 from storage into a room inside a building. In one embodiment, the containers 21 include opening doors 22 and carrying frames 23. The containers 21 rest upon V-grooved wheels  
15 24 that run on tracks 25. This allows the containers 21 to be moved off of the loading dock 26 and onto to the first positioning system 28 in order to be accessed by the second positioning system 38. The containers 21 may be specially designed so that it can house items in such a way that they can be made ready for quick use. For instance, the containers 21 may be designed so that in a matter of a few minutes or so, a person could  
20 convert an empty room into a dinning room complete with a 100" long table, 10 or more chairs and a full size china cabinet. See FIG. 9 for the depiction of such a room concept. Further, the same room could be converted into a bedroom complete with a full size dresser and King sized bed, or into a home office complete with storage desk, cabinets,

credenza, extended work table, file cabinets, full size office chair and instant internet connection and AC power.

The containers 21 can be designed so that contents can be accessed from both sides. The containers 21 design can range from the simple mimicking of what is  
5 traditionally a standard bedroom closet to the sophisticated. Quick disconnects for electrical power and water service may be utilized to allow the containers 21 to house appliances.

In some embodiments, the first positioning system 28 is a trolley. Alternatively, the first positioning system 28 may have a first trolley positioned besides another second  
10 trolley. However, other methods of locating and positioning the containers 21 for transport are contemplated. One example, among other possible examples, of an alternate form of the first positioning system 28 would be a rotating carousel. The containers 21 placed in the carousel would be easily located into position simply by rotating the carousel. Similarly, other methods of locating and positioning the containers  
15 21 known to those skilled in the art for transport may be used. In this embodiment, the containers 21 are movable on the X, Y and Z axis for the greatest flexibility in access and placement.

In some embodiments, the first positioning system 28 further includes track 29 that cooperates with the V-grooved wheels 25 on the containers 21. The electric winch  
20 31 rotates pulling the cable 32, anchored to the ground at the anchors 33, around itself and therefore enables the first positioning system 28 to move up and down along the Y-axis. The hitch 30 engages the carrying frames 23. The hitch 30 moves laterally along the X-axis pulling the containers 21 off of the platform 26 onto the track 29. Lineal

motion of the hitch can be achieved through the use of a ball screw, a push/pull, tracks, winch, or other linear motion devices. Once the containers 21 are located on the track 29 and cleared for transport, the electric winch 31 rotates pulling the cables 32 towards the second positioning system 38. The containers 21 travel smoothly along the Y-axis  
5 towards the second positioning system 38 using the V-grooved wheels 35 and the tracks 34. An alternate form of the first positioning system 28 is illustrated in detail hereinbelow in FIG. 5.

Referring now to FIG. 2, the second positioning system 38 is illustrated in more detail. In one form, the second positioning system 38 includes guide cables 39 and lifting  
10 hitch 40. The lifting hitch 40 is connected to a lifting cable 41 at a connection point 42. The guide cables 39 are connected to the wall at anchors 43. Before insertion of the containers 21, the lifting hitch 40 is located at a height that allows the protrusions 44 to extend over the hooks 45 of the lifting hitch 40. Once the containers 21 are firmly secured within the lifting hitch 40, then the lifting cable 41 can pull the containers 21.  
15 The upward travel of the containers 21 are guided by the guide cables 39. In other embodiments, a lifting platform that extends from the ground pushing the container 21 upwards instead of using a lifting cable is envisioned. Other devices for upward travel commonly known to those skilled in the art are also contemplated.

Referring now to FIG. 3, the carrying frame 23 is described in more detail. In this  
20 embodiment, the carrying frame 23 includes a top plate 48 and a bottom plate 49. The top plate 48 and the bottom plate 49 include protrusions 50 at either end of the top plate 48 and the bottom plate 49. The top plate 48 and the bottom plate 49 may be composed of carbon steel, aluminum, titanium or other sturdy material. Also, the carrying frame 23



includes a first side plate 51 and a second side plate 52 which both include slots 53. As readily apparent from FIG. 3, the top plate 48 and the bottom plate 49 fit into the first side plate 51 and the second slide plate 52 at slots 53 to construct the completed carrying frame 23. Joinder may be achieved by welding, brazing, interference fit, or any other method commonly known to one skilled in the art of providing fixation between the top plate 48, the bottom plate 49, the first slide plate 51 and the second slide plate 52.

Referring now to FIG. 4, an exploded side view of the bottom of one of the containers 21 according to one embodiment is illustrated. As shown in FIG. 4, the V-shaped rollers 24 ride along tracks 25 and 29, allowing the containers 21 to move along the X-axis as depicted in FIG. 1. As FIG. 4 also illustrates, the bracket 57 rests against the back of the containers 21. The bracket 57 is an anti-tip over bracket which restricts the containers 21 motion and prevents the containers 21 from tipping over while in storage or during deployment. The bracket may be formed of steel, high strength plastic, or any other materials commonly known to one skilled in the art that is suitable for ensuring that the containers 21 do not tip over or move laterally while in storage. The bracket 57 is firmly attached to an U-channel 59 through the use of bearings 58 to further assist the bracket 57 in holding the containers 21 and ensuring that an unbalanced load does not become wedged and unmovable. The bearings 58 can be any bearings readily apparent to one skilled in the art for ensuring that the bracket 57 does not move.

In one embodiment, the drive motors (not shown) used are capable of variable speed so that the containers 21 can be moved smoothly preventing their contents from being shifted inside. In yet another embodiment, the room exchange system 20 includes

a container storage area within an enclosed area with appropriate mechanical lockout systems to prevent access to the area while the mechanisms are in motion.

Referring now to FIG. 5, one room concept enclosed in a container installed inside of a building is illustrated. In this one embodiment, a closet 63 includes a chest of drawers 64 and a bed 65. Moreover, a control system 62 such as a computer control system is disclosed for controlling the positioning of the containers.

The movement of the containers 21 in this embodiment may be initiated from a keypad or other entry device via the control system 62. The human to system interface may provide the user the ability to selectively move containers into selected access rooms. Low cost models may have simple inexpensive controls located in a single location with readouts that merely allow users to assign containers by number to access rooms by number. More elaborate and expensive models may be equipped with features such as voice activated controls, color monitors, and scanning systems that can keep track of container contents and even perform inventory control procedures.

The control system 62 can track the frequency of use of different containers and automatically arrange the containers placing the most frequently used containers nearest to the access chutes they are most commonly used. In this way, the time required to exchange them will be reduced. Additionally, the system will have multiple user-definable speed settings, which will provide control over how fast the containers are moved in and out of place. This ability to distinguish speeds will allow containers that contain fragile objects such as china to be handled in a very delicate manner, while containers containing non-fragile items such as blankets and clothing, to be moved rapidly.

Moreover, the control system 62 can provide climate control within the main storage area so that the temperature and/or humidity, etc. levels are maintained within set levels. This is more efficient than providing climate control for an entire basement, attic or other unregulated space if such climate control is not needed outside of the main  
5 storage area.

Referring now to FIG. 6, the room concept of FIG. 5 is depicted as expanded. The expanded bedroom describes the items in their common placement.

Referring now to FIG. 7, another room concept is illustrated. FIG. 7 depicts an installed closet 68 containing a dining room set. The installed closet 68 includes a table  
10 69 and chairs 70 and leaves 71, in a compact position.

Referring now to FIG. 8, the positioning of installed closet 68 is illustrated. The table 69 rotates downward using a U-shaped receptor 72 and a cable 73 to allow a slow and gradual lowering of the table. The cable 73 is attached to counterweights (not shown) that are behind the wall to allow a smooth and gradual lowering of the table into  
15 position. The chairs 70 are spread apart and the leaves 71 may be inserted into the table 69 to increase its length. In an alternative embodiment of this illustration, is a drop leaf expansion table stored in the lower cabinet of a china cabinet or hutch with chairs stored in an alternate cabinet.

Referring now to FIG. 9, a computer closet 79 is illustrated as having a file  
20 cabinet 80 and chair 81 and a table 82. FIG. 9 depicts the computer closet 79 in its packed condition immediately after the second positioning system 38 has exchanged it with the room in the building.

Referring now to FIG. 10, the expanded computer closet 79 as deployed and ready for the user to use is illustrated. The table 82 has been set up on the right side. The file cabinet 80 extends outward providing more surface area in order to do work on the computer. The chair 81 is also expanded and ready for the user to sit down and begin  
5 using the computer.

Referring now to FIG. 11, an alternate embodiment is illustrated. In this embodiment, a carrying cage 90 is used to transport the containers 21. The carrying cage 90 includes a guiding system 91 to guide the carrying cage 90 along the Y-axis, a support system 92 to hold the containers 21 in place, and a lifting system 93 to lift the containers  
10 21 so that they may be exchanged with the room.

The guiding system 91 includes the guide members 94 and guide rails 95. In the illustrated embodiment, the guide rails 95 run along the top of the guide members 94 as a rack and pinion system. In alternate embodiments, cooperating grooves, ball bearings, or other devices readily apparent to one skilled in the art guide the guiding system 91 along  
15 the Y-axis. In this embodiment, a motor 96 has a gear 97 that drives a shaft 98 to turn the sprocket 99 to move the carrying cage 90 in the Y direction. In alternate embodiments, among a variety of others, a push-pull or winch system is used.

The carrying cage 90 also includes the support system 92. In the illustrated embodiment, the support system includes tubular supports 100 that are on the outside and  
20 define the outside corners of the carrying cage 90, bracketed supports 101 that run in pairs along the two narrow sides of the carrying cage 90, connection members 102 that run perpendicularly to the guide rails 95 and connect all of the tubular supports 100 and the bracketed supports 101, cross members 103 that run parallel to the guide rails 95, and

a top cage 104 that connects all of the tubular supports 100 and the bracketed supports 101 around the top of the carrying cage 90. In this embodiment, the tubular supports 100 are constructed to accommodate rollers to allow the lifting system 93 to lift the containers 21 into place. In alternate embodiments, cooperating grooves, ball bearings, or alternate  
5 methods of allowing guided motion in the Z direction are contemplated.

The carrying cage 90 also includes the lifting system 93. The lifting system 93 includes connection members 105 that are connected to pillow blocks 106 that include rollers 107 adapted to roll along the tubular members 100, cross members 108 that connect to the connection members 105, and support members 109 to support the  
10 containers 21 when they are loaded into the carrying cage 90. The lifting system 93 also includes a first support plate 110 and a second support plate 111 to support a hitch 112. In the illustrated embodiment, the hitch is driven using gears 113 that are driven by a motor 114. The hitch 112 is used to move the containers 21 linearly into the carrying cage 90. In alternate embodiments, timing belts or other linear motion devices are used  
15 to move the containers 21 into place.

The lifting system 93 also includes dual sprocket sets 115 and single sprocket sets 116 to connect to the driving chains 117, and a drive motor 118 to drive the driving chains 116 around the sprocket sets 115, 116. The driving chains 117 begin by attaching to the connection members 105 and looping over the single sprocket sets 116. Then the  
20 driving chains 117 wrap around one of the individual sprockets of the dual sprocket sets 115 and back up to be connected to the connection members 105. In the illustrated embodiment, the attachment is performed by attaching the chains to holes in the connection members 105. In one alternate embodiment, the attachment is made using a

clevis. The dual sprocket set 119 that is attached to the drive motor 118 has driving chains 117 wrapped around each sprocket of the dual sprocket set 119 and the other remaining individual sprocket of the dual sprocket set 115. In operation the drive motor 118 drives the sprockets set 119 that in turn drives the sprocket sets 115 and 116 thereby  
5 lifting the containers 21 into place.

In operation, the embodiment of FIG. 11 operates by the guiding system 91 guiding the carrying cage 90 along the Y direction. Simultaneously, the hitch 112 moves along the X direction towards the containers 21. The carrying cage 90 will stop short of the containers 21 to be picked up to allow the hitch 112 to move into position. When the  
10 hitch 112 is moved into position the carrying cage 90 moves into position and the hitch 112 engages the containers 21. The containers 21 are then pulled inside of the carrying cage 90. The carrying cage 90 is then positioned under the room to be exchanged. The lifting system 93 then lifts the containers 21 into the room where they are fixed in the rooms using lockouts (not shown). In alternate embodiments, there are two carrying  
15 cages 90, one inside another, that can lift the containers 21 up into a room two stories above.

### **EXAMPLES**

The following are other room concepts that may be used in alternate embodiments of the present invention. Other embodiments besides these may be used in accordance  
20 with the present invention.

#### **Laundry Center**

With cabinet storage, ironing board, and quick disconnects for AC, hot and cold water and dryer vent.

### **Fitness Center**

With treadmill, resistance training equipment, television and refrigerator

### **Wet Bar**

Special security access code to prevent minors from bringing container into

5 access position.

### **Patio Center**

With access from exterior, houses refrigerator, entertainment center, cook area, and room to store cushions.

### **Woodworking Shop**

10 With built in wood working equipment, workbench, lumber storage, and built in vacuum for cleanup.

### **Kids Play Room**

With activity table and chairs, and storage for art supplies, toys and games, could include fold out slide and telescoping support for toddler swing.

### **Media Center**

15 Complete with large screen plasma television and furniture, couch rolls out on wheels that can be locked into position, two recliners are stored on a shelf above the couch, after the couch is rolled out, the shelf is lowered by an electrical winch to put chairs level with floor so they can be rolled out as well. Protective cover for plasma  
20 screen flips out of way and plasma screen is moved on a slide from the back of the cabinet where it is stored into position where it is flush with wall so it can be easily viewed.

### **Deep Freezer, Refrigerator and Pantry**

For expanded food storage capacity.

### **Lawn and Garden Center**

Accessible from garage or other outside point, complete with work area for potting plants, includes storage of hand tools and supplies.

5

### **Train Table**

Model train layout table with fold out legs is stored in container vertically. Table is moved into horizontal working position through the assistance of a cable attached to counter weights.

10

### **Sewing Center**

With built in sewing machine work center and storage for bulk fabrics and projects.

### **Gun Cabinet**

With higher level security code for safety.

15

### **Wine Cabinet**

With temperature control.

### **Accessible Bathing Area**

Therapeutic whirlpool tub which can be safely and comfortably used by persons with physical disabilities. Tub would include swing open doors so that bather does not have to enter unit by climbing over tub wall. Also could include a water storage area so that water of bathing temperature is prepared and ready in holding tank for quick transport into tub to prevent bather from becoming cold while waiting for unit to fill with water.

20



While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the

5 invention are desired to be protected.